TOWN OF BOTHWELL GROUND WATER SURVEY

D. J. Andrijiw

1974

Ministry of the Environment

The Honourable
William G. Newman,
Minister

Everett Biggs,
Deputy Minister

MINISTRY OF THE ENVIRONMENT

TOWN OF BOTHWELL

GROUND WATER SURVEY

D.J. Andrijiw

1974

MINISTRY OF THE ENVIRONMENT

REPORT ON FIELD INVESTIGATIONS

DATE OF EXAMINATION - May 1, June 12, 1974 **PLACE -** Town of Bothwell

MATTER INVESTIGATED - Ground Water Survey

AT REQUEST OF - Project Development Branch

INSPECTION MADE IN COMPANY WITH - S. Sisson
P. Sangster

OTHER PARTIES SEEN -

REPORTS TO BE SENT TO - J. Timko
E. Czarnecki, Attn: K. Goff, London Office
A. Ladbrook, London Office
Central Records

OTHER RECOMMENDATIONS TO THE OFFICE RE PROCEDURE TO FOLLOW -

Two extra copies of this report are provided to the Project Co-Ordination Section for distribution to the Municipality and the consulting engineer at its discretion.

REPORT BY D. J. Andrijiw

D. J. Andrijiw, Hydrogeologist.

NOTE: This completed form to be attached to each report.

MOE 07-154/7/73

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MINISTRY OF THE ENVIRONMENT

TOWN OF BOTHWELL
GROUND WATER SURVEY

INTRODUCTION

A ground-water survey in the vicinity of the Town of Bothwell was conducted to determine the feasibility of utilizing local ground-water resources as a source of water supply for the town. The survey was conducted at the request of the former Project Development Branch as part of their proposed municipal water works program for Bothwell. If ground-water conditions proved to be favourable, potential test-drilling sites would be indicated and an estimated cost of the test-drilling program would be provided.

The study was confined to an area within a radius of about 2 miles (3,2 km.) of the Town of Bothwell and consisted of an office study of water-well records, topographic maps and geologic reports. A field reconnaissance was made to observe geologic and topographic features. Water samples were collected from both bedrock and overburden wells in the vicinity to determine the chemical quality of ground water in the area.

The water-well records of the study area are listed in Table 1. The location of each well is shown in Figure 1. The well numbering system used in this report relates to the permanent coding numbers of the Ministry of the Environment.

PRESENT SUPPLIES AND REQUIREMENTS

Residents within the study area obtain water for their use from shallow individual well point systems, and from drilled wells which terminate in the overburden or the bedrock.

The Ministry's Technical Services Branch provided the following information. The present population of Bothwell is 817 and is expected

to increase to about 1,200 by the end of the 20-year design period. Assuming a maximum-day to average-day demand ratio of 2.5 to 1 and an average daily consumption of 100 gallons ($0,45m^3$) per person, a well water supply capable of yielding 85 gpm (545 m^3/day) on a perennial basis, and 210 gpm (1364 m^3/day) on a short term basis, is required for the design period. Storage would be required to meet peak-hourly and fire-flow demands.

GEOLOGY

Bedrock

The Town of Bothwell is underlain by Paleozoic sedimentary rocks of Upper and Middle Devonian age.

Bothwell is underlain by the Kettle Point formation of Upper Devonian age. The formation comprises black bituminous shale with greenish-grey shale interbeds. The logs of oil and gas-test wells drilled in the vicinity of Bothwell indicate that the formation thins out towards the east and attains a thickness of about 60 feet (18,3 m) towards the west of the study area.

The Hamilton group of formations of Middle Devonian age underlies the Kettle Point formation. The Hamilton Group comprises shale and argillaceous and crinoidal limestone. The Hamilton Group varies from 165 feet (50,3 m) in thickness in the east to about 225 feet (68,6 m) in the west of the study area.

Overburden

The overburden in the study area consists primarily of Pleistocene deposits of glacio-fluvial and lacustrine origin.

The Bothwell sand plain covers the entire study area. The sands are deltaic in origin and were deposited at the time of glacial Lake Warren. The surficial sand varies in thickness from 11 feet (3,3 m) to 33 feet (10,1 m). The sand is underlain by clay or clay and stones

and overlies hardpan or sand and gravel above the bedrock. The entire overburden attains a thickness of up to 143 feet (43,6 m) in the study area.

HYDROGEOLOGY

Bedrock

Water in the bedrock moves primarily through interconnected openings such as fractures, joints and bedding planes. Water in interconnected, intergranular pore spaces contributes to storage in the aquifer rather than well yield. The yield from a bedrock well is generally dependant upon the number, size and interconnection of the openings which the well intercepts. About half of the drilled water-wells obtain potable water supplies from the shale of the Kettle Point formation. Penetration into the bedrock varied from 1 foot to 52 feet (0,3 m to 15,9 m). Only one water-well penetrated the limestone of the Hamilton Group of formations, however, the well was backfilled to a depth of 65 feet (19,8 m) because of poor quality water in the lower aquifer.

The specific capacities of the bedrock wells varied from .003 to 7.5 gpm per foot of drawdown (0,064 to 161,1 m^3/day/m), with many of the bedrock wells having specific capacities of less than 0.1 gpm/ft. of drawdown (2,15 m^3/day/m). Many of the bedrock wells penetrate only a few feet into the bedrock and appear to be hydraulically connected to the basal sands and gravels.

Overburden

In the overburden, water is transmitted through inter-granular openings in the sediments, and hence the sorting, shape and grain size of the overburden materials affect its ability to transmit water. Sand and gravel beds are the most favourable overburden materials for the development of large capacity wells.

The logs of the water wells indicate that water is present in the surficial sands and in sands and gravels overlying the bedrock.

The surficial sand is about 30 feet (9,1 m) thick in the Town of Bothwell and thins to about 22 feet (6,7 m) north of Bothwell and to about 14 feet (4,3 m) south of Bothwell. Although sand points generally yield sufficient quantities of water for individual domestic use, it is unlikely that a single drilled well completed in the surficial sand could yield the total water requirements for Bothwell.

The basal sands and gravels range in thickness from 3 feet to 26 feet (0,91 m to 9,72 m). The thickest basal sand and gravel formation is found underlying the Town of Bothwell. The wells in the centre and towards the eastern limit of Bothwell penetrate from 12 feet (3,6 m) to 25 feet (7,6 m) of the sand and gravel. To the north and the west, the sand and gravel formation thins to about 2 to 7 feet (0,6 m to 2,1 m). To the south, the deeper sands and gravels are interstratified by layers of hardpan.

In Bothwell, the deep overburden wells yield from 0.25 gpm (1,4 m^3/day) to 15 gpm (98,2 m^3/day) with the average yield being about 5 gpm (32,7 m^3/day). To the north the wells yield from 0.66 gpm (4,3 m^3/day) to 8.3 gpm (54 m^3/day). To the west the wells yield 1 gpm (6,5 m^3/day) while to the south the overburden wells yield from 3.5 gpm (22,9 m^3/day) to 15 gpm (98,2 m^3/day).

The specific capacities of the drilled overburden wells varied from 0.02 to 3.3 gpm/foot of drawdown (0,43 to 70,87 m^3/day/m), with many of the specific capacities being above 1.0 gpm/ft. of drawdown (21,48 m^3/day/m).

WATER QUALITY

Bacterial

Fifteen samples were taken to assess the general bacteriological quality of ground water in the area. The results of the analyses are shown in Table 2. Of the fifteen samples, only one contained more than the 10 coliforms per 100 mls. considered to be a safe level of concentration.

The results show that bacterial pollution is minor and local in extent.

Chemical

Fifteen samples were located to assess the chemical quality of the ground water in the overburden and bedrock. The results of the analyses and the type of aquifer from which the sample was taken are located in Table 3.

About half of the water analyses indicate that the iron concentration exceeds the recommended limit of 0.3 ppm. Iron concentrations range from .05 to 1.5 ppm in the surficial sands while in the deeper aquifer, the range is between 0.05 to 4.0 ppm. Treatment for the removal of iron may be required.

Hardness values for the wells terminating in the shallow sand aquifer indicated that the water is generally very hard while the deeper aquifer has soft to moderately hard water.

Only one well, #4577, indicated a very high chloride concentration of 1360 ppm, which exceeds the Ministry's permissible criteria of 250 ppm.

One of the sampled wells had a high nitrate concentration of 9.6 ppm which approaches the Ministry's permissible criterion of 10.0 ppm. The main sources of this type of contamination are animal wastes, septic tank effluents and the heavy use of nitrogen fertilizers.

FAVOURABLE TEST DRILLING AREAS

On the basis of the available hydrogeologic data, the areas shown in Figure 1 appear to be the most favourable for testing. Any test wells drilled in these areas should penetrate the entire thickness of the overburden and the upper 10 feet of bedrock. Drilling deeper into the bedrock is not recommended because of the poor yield characteristics of the rock aquifers and the possibility of encountering poorer quality water at depth.

COST ESTIMATE OF TEST DRILLING

It is estimated that up to 8 test holes and observation wells will be required to adequately evaluate the potential of aquifers in the area to yield large supplies of water.

The estimated cost of this test-drilling program is $24,500.00. A breakdown of the cost is as follows:

Mobilization & demobilization	$ 750.00
Moving and Setting Up	2,000.00
Drilling	9,000.00
Development	3,500.00
Pumping Tests	5,800.00
Casing & Associated Materials	2,850.00
TOTAL	$23,900.00

Additional funds should be made available to cover the cost of items associated with test drilling, such as: property options, ingress and egress facilities, and the temporary restoration of water supplies which may be interrupted during drilling or test pumping. The allowance for miscellaneous work is $600.00.

If a test well is completed in the rock and yields a sufficient quantity of water, it may be left as a permanent well.

Upon completion of the test-drilling program, the number and type of wells necessary to serve as a water supply source will be indicated along with estimated costs of their construction.

CONCLUSIONS

The chances of developing a single municipal well capable of yielding 210 gpm are only fair. However, the ground-water conditions in Bothwell and the surrounding area appear to be sufficiently favourable to warrant a test-drilling program.

It is unlikely that a drilled well completed in the surficial sand can meet the water requirements of Bothwell.

Supplies of ground water of acceptable chemical quality might be developed from the basal sand and gravel or from the upper 10 feet of bedrock. However, the water obtained from wells completed in these aquifers may require treatment for iron.

RECOMMENDATIONS

It is recommended that:

1) Any test drilling program for Bothwell be carried out in the areas outlined in this report.

2) A sum of $23,900.00 be provided for test drilling, with an additional $600.00 allowance for miscellaneous work, such as property options, restoration of water during pumping tests, etc.

3) Extended pumping tests be carried out on any test wells encountering favourable formation to determine the amount of interference with nearby wells and any changes in chemical water quality with respect to pumping time.

4) The necessity for treatment of the water should be determined from the results of the chemical analysis of the water samples obtained during the testing.

5) In accordance with Ministry policy, it will be necessary to provide for the restoration of water supplies to residents outside the serviced area whose wells are affected by the operation of any new municipal well to such a degree that an adequate supply cannot be obtained by means of a shallow or deep well pump.

Report by:

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Ground Water Development Section,
Project Co-ordination Branch.

Approved by:

T.J. Yakutchik, Manager,
Ground Water Development Section,
Project Co-ordination Branch.

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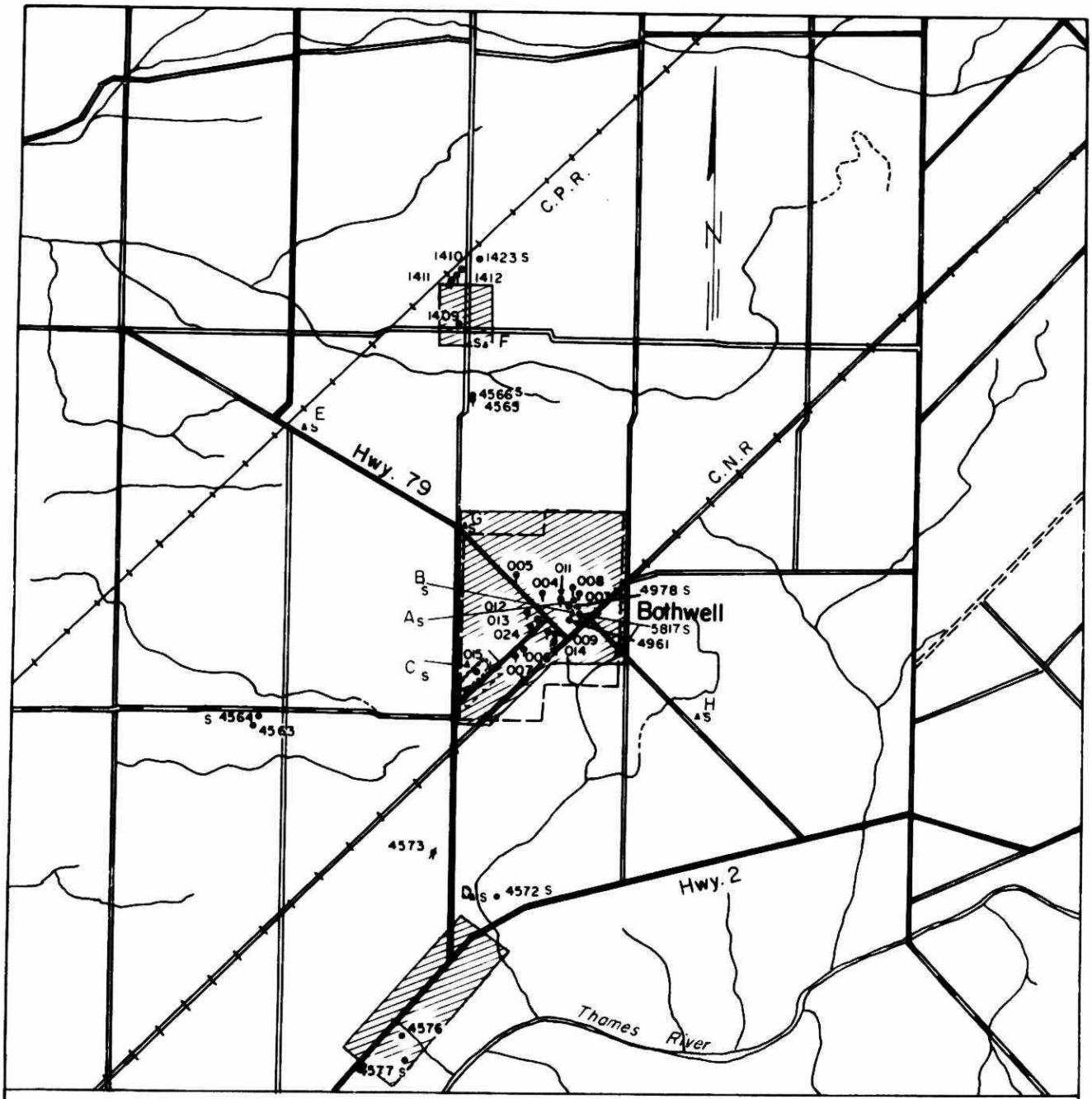

Legend

- *Drilled well in bedrock*
- *Drilled well in overburden*
- *Abandoned well*
- s *Sample locations*
- *SAND POINT 4 Recommended test drilling area.*

MINISTRY OF THE ENVIRONMENT
Water Quantity Management Branch

TOWNSHIP OF ZONE

TOWN OF BOTHWELL

GROUND WATER INVESTIGATION

Date: April, 74	Scale:	Drawing No:
Prepared by:	1:50,000	Fig. 1

MINISTRY OF THE ENVIRONMENT

Table 1 Summary of Water Well Records

Date March, 1974

Prepared by PS

Well No	Location and Elevation	con	lot	Owner	Driller	year	Well Type	Well Diameter (inches)	Depth (feet)	Static Level (feet)	Pumping Test (gpm) (hrs)	Pumping Level (feet)	Quality	Use	Remarks. Log. etc * DEPTH WATER FOUND
4576	Zone Twp Kent Co. RIVER RANGE 650		10	HAROLD MARCUS	SYDNEY EARL	60	●	3 5/8	102	46	3 1/2/8	80	Trace of Salt	D	0-11 RED SAND *51 11-85 BLUE CLAY 85-97 HARD PAN 97-102 F. grvl. 1/8" dia.
4577	R. River 655 RANGE		10	"	Wm. MARSH	67	●	5	143	53	15/2	65	6-14 salty 117-126 FR 138-142 FR	D	0-6 Sand *6-14 6-14 Gravel & sand 117-12 14-73 Gray cly & stns 138-14 73-87 Sand 87-117 Hd. pan 117-126 grvl & snd. 126-138 Hd pan 138-143 Grvl. size of wheat & less 142-143 Hard pan
4961	675 Town of BOTHWELL			HATTIE ELLWOOD	"	69	●	4	98	19	3/4	25	FR	D	0-28 Gray sand *5,88 28-71 Gray clay 71-82 Hd. pan 82-98 Sand & Gravel
4978	" 680			G. Brearley	"	70	●	6	103	20	6/4	26	FR	D	0-3 BROWN SAND *8,80 3-30 Gray Sand 30-80 Gray cly. some pebbles 80-103 Brwn gry sand & grvl.
	LAMBTON CO.														
1409	EUPHEMIA TWP. 660	8	16	Alex. Stuart	E.R. McGaffery	49	●	4	81	14	6/1	—	FR	STOCK	0-27 SAND *81 27-74 Clay 74-78 SAND 78-81 GRAVEL
1410	" 660	8	16	"	"	49	●	4	93	14	8.3/1	—	FR	D	0-21 TOP SAND *93 21-76 BLUE CLY 76-79 SAND 79-89 Hdpan 89-91 Sand 91-93 Gravel
1423	EUPHEMIA TWP. 670	9	17	JOHN McMASTER	Wm. MARSH	67	●	5	97	8	3/50	21	FR	D & STOCK	0-5 RED SAND *91-94 5-28 GRAY SAND 91-94 SAND & gr.vl. 28-74 GRAY CLAY 94-97 Hd.pn. 74-80 SANDY Hd PA. 80-91 CLY & STONES
1411	" 660	8	16	JACK STUART	E.R. McGAFFERY	53	✱	4	90	8	.66/24	—	FR	ABANDONED	0-22 TOP RED SAND *89' 22-74 Blue cly. 74-75 F.Grvl. 75-88 Hd.pan 89-90 TOP ROCK 88-89 F. Grvl. & Gas
1412	" 660	8	16	"	"		●	4	95	10	.66/24	—	FR	STOCK	0-22 TOP RED SAND *88 22-75 BLUE CLAY 75-76 F SAND 88-95 TOP ROCK 76-79 Hd PAN 79-88 White Hd Pan
024 W-0AR	KENT CO. ZONE TWP. 680 TOWN OF BOTHWELL			GRAHAM CHAMBERS	Wm. MARSH	67	●	5	109	20	10/4	40	FR	COMMERCIAL D	0-30 Sand 93-101 grvl *10-3 30-78 GREY CLAY 101-104 sd & silt 78-83 F. sd 104-109 BLK. SHALE 83-93 C Sd & grvl

MINISTRY OF THE ENVIRONMENT

Table **Summary of Water Well Records**

Date March 74

Prepared by P.S.

Well No.	Location and Elevation (Kent Co. con lot)	Owner	Driller (year)	Well Type	Well Diameter (inches)	Depth (feet)	Static Level (feet)	Pumping Test (gpm) (hrs)	Pumping Level (feet)	Quality	Use	Remarks. Log. etc (* Depth Water Found)
003	Zone Twp. Town of Bothwell 675	Martin Burgess	Roy McGaffery 47	●	4	140	17	—	—	FR	D	0-26 Top Sand *87 26-80 Blue Clay 80-87 Hard Pan 87-88 Gravel 88-140 Black Shale
004	" 680	Reid Menzies	" 50	●	4	109	20	—	—	FR	D	0-30 Top Sand *89 30-80 Clay 80-100 Sand & Gravel 100-109 Black Shale
005	" 679	Milton Beaul	" 51	●	4	102	21	—	—	FR	D	0-30 Top Sand *100 30-80 Clay 80-100 Sand & Gravel 100-102 Black Shale
006	" 675	Reid Menzies	" 59	✱	5	109	15	—	—	F-R	Abandoned	0-4 Sand Red *100 4-27 Sand Gray Bearing Water 27-70 Brown Clay 70-100 Clay w. Pebbles 100-109 Black Shale
007	" 675	"	Wm. Marsh 59	●	5	115	25	1¼/48	90	FR	D	0-4 Red Sand *85 4-26 Grey Water Bearing Sand *92 26-69 Brown Clay 69-80 Clay w. Pebbles 80-85 Pipe Gravel
008	" 675	A. Doman	Roy McGaffery 59	●	5	109	35	1/48	90	Gas Smell (FR)		85-91 clay w. pebbles 91-115 Black Shale.
												0-5 Red Sand *88 5-32 Water, Sand Gray 32-60 Brown Clay 60-88 clay w. small stones 88-100 Gravel & Black Sand 100-109 Black Shale
009	" 675	Graham Chambers	Sydney Earl 60	●	4	97	20	3½/10	60	FR	D	0-28 Red Sand *94-96 28-80 Clay 80-90 hard pan 90-97 Black Shale
011	" 681	R. Beatty	Wm. Marsh 65	●	5	115	21	3/10	100	FR (Had a lot of Gas)	D	0-3 Red Sand *81-94 3-31 Gray Sand 31-81 Gray Cly. and Stones 81-94 Gravel and Sand 94-115 Black Shale
012	" 675	A.C. Doman	" 65	●	5	112	21	4/3	20-30 Ft.	FR	D	0-30 Sand *82-107 30-82 Gray Clay & Stones 82-107 Gravel & Sand 107-112 Shale
013	" 675	"	" 65	●	5	112	21	7/3	"	FR	Garage	0-30 Sand *82-107 30-82 Gry cly and stns 82-101 Grvl. and sd 107-112 Black shale.
014	" 675	Ivan Perritt	Sydney Earl 65	✱	4	98 85	20	4/6	48	"	Abandoned	0-29 Sand *85 29-80 Clay 80-98 Black Shale

07-048

MINISTRY OF THE ENVIRONMENT

Table **Summary of Water Well Records**

Date MARCH 74

Prepared by P.S.

Well No.	Location and Elevation — KENT CO.	con	lot	Owner	Driller — year	Well Type	Well Diameter (inches)	Depth (feet)	Static Level (feet)	Pumping Test (gpm) (hrs)	Pumping Level (feet)	Quality	Use	Remarks. Log. etc — * Depth WATER FOUND
015	ZONE TWP TOWN OF BOTHWELL 682			O.W.R.C.	FAULKNER WELL DRILLING 66	●	6	34	2.8	NO TEST		FR	Observation gauge hole	0-.5 TOPSOIL *14 .5-5.5 BROWN FINE SAND 5.5-14.0 LIGHT BROWN " " 14.0-24.0 GREY " " " 24.0-29.5 GREY Coarse Sand Seam 24.5-28 GREY FINE SAND 28-29 GREY Coarse to Fine Sand 29-33 GREY Coarse Sand & Fine to 33-34 med. Gravel GREY Silty Clay Till
018	" 682			O.W.R.C.	" 66	●	6	32.5	2.9	NO TEST		FR	"	0-13 BROWN FINE SAND *13 13-29.5 GRAY Fine SAND 29.5-31.5 GREY C to f ~~sand~~ & fom gr'vl. 31.5-32.5 Grey silty till
4563	ZONE TWP. 660	VII	X	V. DEMAITER	Wm. Marsh 60	●	4	91	17	1/4	81	FR	ABANDONED	0-30 SAND *82 30-80 CLAY 80-82 F. Gravel 82-88 Hd. pan & sand 88-91 Black Sand
4564	665	VII	X	"	"	"	"	"	"	"	"	"	D. GREENHOUSE & TOBACCO	0-32 SAND *90 32-86 Brown Clay 86-90 Mixed Sd & Gr'vl. 90-92 Gravel 92-99 Hd. Pan
4565	675	IX	XV	JAS. VAN GOETHEM	E. McGAFFERY 52	●	3 5/8	110	DRY	—	—	—	ABANDONED	0-16 TOP YELLOW SAND 16-70 BLUE CLAY 70-82 HARD PAN 82-109 FINE SAND 109-110 BLACK SHALE
4566	ZONE TWP 675	IX	XV	"	" 52	●	3 5/8	108	14	9.1/	—	FR	D STOCK	0-17 TOP Yellow Sand *108 17-79 Blue Clay 79-92 Fine Sand 92-106 Hard Pan 106-108 Coarse Sand
4572	" 675	N. L. R.	15	OLIVER CROWELL	SYDNEY EARL 57	●	4	101	70	6.6/	80	FR	F	0-80' drilled in 1940 *101 80-96 Hd. pan 96-101 Gravel
4573	ZONE TWP 660	N. L. R.	17	L. WILKINS	ROY PINSONNEAULT 63	●	4	122	—	—	—	DRY	ABANDONED (DRY)	0-8 Yellow Sand 8-26 Quick Sand 26-79 Blue Cly 79-86 Clay, sandstones 86-139 Sandstones
5817	TOWN OF BOTHWELL 680			ROYAL C.D.N. LEGION	Wm. Marsh 73	●	6.5	102	23	15/12	25	FR	LEGION HALL	0-10 br. sd *10-31 10-31 gry sd 31-86 gry. cly. & pebs. 86-101 86-94 Br. gry, grvl. Sd. some gas 94-97 br. sd. 97-101 br. grvl. and sd. 101-102 black shale

MINISTRY OF THE ENVIRONMENT

TABLE 2 SUMMARY OF BACTERIOLOGICAL RESULTS

PREPARED BY

LOCATION	DATE	FECAL COLIFORMS	FECAL STREPTOCOCCUS	TOTAL COLIFORMS	BACKGROUND COLONIES	
LOTAN'S ELECTRIC WELL #1 A	MAY 1, 1974	0		0	0	
BREARLEY #4978	MAY 1, 1974	0		0	0	
MEREDITH B	MAY 1, 1974	0		0	0	
BOTHWELL DRIVING CLUB C	MAY 1, 1974	0		0	0	
O. CROWELL 4572	MAY 1, 1974	0		0	0	
A. CROWELL D	MAY 1, 1974	0		0	0	
H. MARCUS 4577	MAY 1, 1974	0		0	2400	
V. DEMAITER 4564	MAY 1, 1974	0		0	0	
A. CUTLER E	MAY 1, 1974	0		0	0	
J. MacMASTER 1423	MAY 1, 1974	0		0	0	
J. PELSMAEKER F	MAY 1, 1974	0		0	0	
J. VAN GOETHEM 4566	MAY 1, 1974	0		0	0	
BOTHWELL ARENA G	MAY 1, 1974	0		0	0	

MINISTRY OF THE ENVIRONMENT

TABLE SUMMARY OF BACTERIOLOGICAL RESULTS

PREPARED BY

LOCATION	DATE	FECAL COLIFORMS	FECAL STREPTOCOCCUS	TOTAL COLIFORMS	BACKGROUND COLONIES	
ROYAL CDN. LEGION 5817	MAY 1 1974	0		24	340	
J. DEHOEY H	MAY 1, 1974	0		0	0	

MINISTRY OF THE ENVIRONMENT

Table 3 Summary of Water Analyses

Prepared by

Source and Number	Location	Date Sampled	pH	Colour Hazen Units	Turbidity Jackson Units	Conductivity µmho/cm.³	Total Dissolved Solids (ppm)	Total Hardness as $CaCO_3$ (ppm)	Alkalinity as $CaCO_3$ (ppm)	Chemical Constituents in parts per million (ppm)										Remarks
										Chloride (Cl)	Sulphate (SO_4)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potasium (K)	Nitrogen as N: Free Ammonia	Nitrogen as N: Total Kjeldahl	Nitrogen as N: Nitrite	Nitrogen as N: Nitrate	
	BOTHWELL																			
WATER WELL #1	LOTAN'S ELECTRIC A	MAY 1, 1974	8.2			405		38	206	17	3	.10	10	3	92	1.7	<.10	.20	<.02	<.2	
" #2	BREARLEY 4978	MAY 1 1974	8.4			425		36	197	25	2	.30	9	3	93	1.5	<.10	.20	<.02	<.2	
Sand Point #3	MEREDITH B	MAY 1 1974	7.2			780		292	270	21	75	<.05	99	10	53	20	.40	.80	.02	.16	
" #4	BOTHWELL DRIVING CLUB C	MAY 1 1974	7.6			370		204	166	5	32	<.05	65	8	3	2.5	<.10	.10	.02	<.20	
WATER WELL #5	O. CROWELL 4572	MAY 1 1974	7.5			670		96	288	57	2	1.7	25	8	127	3.9	2.2	2.8	.08	<.20	
Sand Point #6	A. CROWELL D	MAY 1 1974	7.7			550		274	178	42	30	<.05	94	9	12	1.7	<.10	.10	.02	9.6	
WATER WELL #7	H. MAROUS 4577	MAY 1 1974	7.9			4150		25	130	1360	<5	.20	4	3	860	2.5	<.10	.10	<.02	<.20	
" #8	V. DEMAITER 4564	MAY 1 1974	8.0			560		59	232	50	2	.05	17	4	111	1.3	<.10	.20	<.02	<.20	
Sand Point #9	A. CUTLER E	MAY 1 1974	7.5			510		285	222	12	50	.70	90	14	6	0.9	<.10	.20	<.02	<.20	
WATER WELL #10	J. MacMASTER 1423	MAY 1 1974	7.3			580		320	193	12	110	4.0	102	15	5	1.8	.40	.60	<.02	<.20	
Sand Point #11	J. PELSMAEKER F	MAY 1 1974	8.1			700		47	201	120	2	1.5	12	3	152	1.8	<.10	.30	<.02	<.20	

MINISTRY OF THE ENVIRONMENT

Table **Summary of Water Analyses** **Prepared by**

Source and Number	Location	Date Sampled	pH	Colour Hazen Units	Turbidity Jackson Units	Conductivity µmho./cm.³	Total Dissolved Solids (ppm)	Total Hardness as $CaCO_3$ (ppm)	Alkalinity as $CaCO_3$ (ppm)	Chemical Constituents in parts per million (ppm)											Remarks
										Chloride (Cl)	Sulphate (SO_4)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potasium (K)	Nitrogen as N				
																	Free Ammonia	Total Kjeldahl	Nitrite	Nitrate	
	BOTHWELL																				
WATER WELL #12	J. VAN GOETHEM 4566	MAY 1 1974	8.2			620		50	203	88	2	.30	12	4	132	1.6	<.10	.20	<.02	<.20	
Sand Point #13	BOTHWELL ARENA G	MAY 1 1974	7.3			940		516	236	50	230	.05	161	27	21	9.3	.20	.30	.10	1.3	
WATER WELL #14	ROYAL CANADIAN LEGION 5817	MAY 1 1974	8.2			400		36	205	17	2	.40	10	2	90	1.8	<.10	.20	.02	<.20	
Sand Point #15	J. DEHOEY H	MAY 1 1974	7.6			395		214	157	8	50	.30	70	9	4	1.5	.10	.10	.02	<.20	